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ORIGINAL ARTICLE

Suicidality in early pregnancy among antepartum mothers in urban India

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Abstract This study assessed the prevalence and predictors of suicidality among 462 pregnant women in South India. Women in early pregnancy (<20 weeks) attending an urban public hospital antenatal center were assessed for suicidality using a modified version of the Suicide Behaviors Questionnaire–Revised (SBQR) and a single-item (item 10) from the Edinburgh Postnatal Depression Scale (EPDS). Severity of depressive symptoms, family violence, and perceived social support were also measured. The prevalence of suicidality in pregnancy was 7.6 % (35/462). Eleven women (2.4 %) reported having had suicidal plans, and 8 (1.7 %) had made a suicidal attempt during the current pregnancy. Younger age, belonging to a middle socioeconomic status, poor perceived support, domestic violence, depressive symptoms, and having a past history of suicidality predicted suicidal ideation during the current pregnancy. Multivariate analysis revealed depression severity and a life time history of suicidal ideation as being the strongest predictors. The findings underscore the need for assessment of psychiatric and psychosocial factors that confer risk among women in this vulnerable period. The results of the study however may be specific to low-income urban women from this geographical location limiting the external validity of our findings.

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Introduction

Suicide is the second leading cause of death for women aged 15–29 years worldwide (Mendez-Bustos et al. 2013), and a leading cause of maternal deaths in the perinatal period (Oates 2003). Suicide has also been identified as one of the major causes of mortality of young women in low-income and middle-income countries (Vijayakumar 2015). In India, while maternal mortality due to other conditions, such as poor antenatal care and malnutrition, has seen a steady decline over the past decade, the scenario for suicide among women during the perinatal period has remained largely unchanged (Shadigian and Bauer 2005).

The prevalence of maternal deaths due to suicide is highly varied between developed and developing countries. In a systematic review and meta-analysis, Fuhr et al. (2014) found the pooled prevalence of pregnancy-related deaths attributed to suicide to be 1.68 % (1.09–2.37) with the prevalence for the southeast Asia region being 2.19 % (1.04–3.68).

While some research supports that women are at reduced risk for suicide during pregnancy, and motherhood, especially when children are very young and most dependent (Qin and Mortensen 2003), other researchers have found suicidal ideation to be elevated in unplanned pregnancies as well as during antenatal depressive episodes (Gavin et al. 2011; Kessler et al.2005; Lindahl et al. 2005). In fact, when all maternal deaths within a year after delivery are considered, suicide is one of the four leading causes of maternal deaths overall (together with thromboembolisms, obesity, and cardiac events) (Brettingham 2004; Lewis and Drife 2001). Further, a previous enquiry has found that approximately 50 % of women who

committed suicide during pregnancy were accessing a psychiatric care service (Oates 2003). This emphasizes the need to improve assessment methods and also to provide access to effective interventions in addition to case identi\ fication.

Recent epidemiological research from the west demonstrates that suicidal ideation may be detectable in a percentage ranging from 13.1 to 33.0 % of pregnant women (Gentile 2011; Newport et al. 2007). Risk factors for suicide during pregnancy include depression and intimate partner violence (Alhusen et al. 2015). Suicidal ideation or suicidal thoughts are significant predictors of suicide attempts and completions making suicidal ideation an important issue to assess for during pregnancy (Moller 2003).

Similar epidemiological enquiries on suicidality during pregnancy are lacking in South Asian and Indian populations. Suicide death rates in India have been found to be among the highest in the world with a large proportion of suicides occurring at younger ages, especially in women (Patel et al. 2012).

Few studies from other LAMI countries have explored the prevalence, associated factors, and common predictors of suicidality among women during pregnancy. A study conducted in Bangladesh reported a 14 % prevalence of thoughts of self-harm during pregnancy, with almost a third of the women with suicidality having prenatal depression (Gausia et al. 2009). Findings from a cross-sectional study in Brazil found the prevalence of suicidal ideation among pregnant women to be 6.3 %. Factors such as living alone and history of psychiatric treatment and smoking had significant associations with suicidal ideation during pregnancy (Huang et al. 2012). Another study from Peru compared items from two common assessment tools (Edinburgh Postnatal Depression Scale and Patient Health Questionnaire-9) used for detection of depressive symptoms and suicidal ideation. Women (15.8 %) reported suicidal ideation on the Patient Health Questionnaire-9 (PHQ-9) item while 8.8 % screened positive on the Edinburgh Postnatal Depression Scale (EPDS)-item 10 (Zhong et al. 2014).

Rates of suicide may also vary depending on the method of assessment. Researchers examining suicidality among women in the perinatal period have used one or more of the following instruments for the assessments—the question 10 of the EPDS (Alhusen et al. 2015; Bowen et al. 2009; Howard et al. 2011), questions about suicidal ideation from the Clinical Interview Schedule (CIS-R) (Howard et al. 2011), Patient Health Questionnaire-9 (Tabb et al. 2013), and researcher-designed structured questionnaires (Healey et al. 2013; Melville et al. 2010; Stallones et al. 2007).

A detailed assessment for evaluating suicidality has scarcely been carried out, with only one study using the suicide module of the MINI Plus, version 5.0 (Castro et al. 2015). Most studies have reported the prevalence of suicidal ideation with very few reporting data on suicidal attempts among women during pregnancy (Asad et al. 2013; Castro et al. 2015; Gausia et al. 2009; Gavin et al. 2011; Howard et al. 2011; Huang et al. 2012; Newport et al. 2007; Zhong et al. 2014). There is a need for conducting thorough assessments in order to identify the presence of any form of suicidality, which can be achieved through a joint evaluation using a screening tool and a structured clinical interview.

This study aimed at determining the prevalence of suicidality (suicidal ideation, planning, and attempts) during early pregnancy and identifying associated and predictive factors among women attending a public health antenatal clinic.

Materials and methods

The study is a cross-sectional study nested within a prospective cohort study, the Prospective Assessment of Maternal Mental Health study (PRAMMS). Pregnant women who registered with the Antenatal clinic at the Government Referral Hospital (GRH) in South Bangalore, India, were eligible to participate in the cohort. The GRH serves the neighborhoods that cover 33 wards from the South Bangalore, Taluk. Recruitment took place between October 2014 and November 2015. Informed consent was obtained from all individual participants included in the study.

The women were assessed on various psychosocial parameters during the antepartum and postpartum periods as part of the cohort. For the purpose of the current evaluation, all women in the cohort who were between 5 and 20 weeks of pregnancy were interviewed.

Women who had a major mental illness such as psychosis or a bipolar disorder, who were identified to have major health complications during the current pregnancy, or were currently using alcohol or other psychoactive substances were excluded. Overall, 462 pregnant women were assessed on the following measures.

Measures

Assessment of suicidal ideation

Suicidal behavior questionnaire

The questionnaire for the assessment of suicidality was primarily modeled on the Suicide Behaviors Questionnaire-Revised (SBQ-R). The original scale comprised of four items assessing suicidal ideation and attempts during the lifetime and the previous year. The total score ranges from 3 to18 with a recommended cutoff score ≥7 for an adult general population (Osman et al. 2001). The questionnaire used for this study was an eight-item instrument assessing suicidal ideation, planning, and attempts during lifetime and current pregnancy. In addition to this, the instrument explores reasons for suicidal

ideation or attempts and the method adopted in case of a suicide attempt.

EPDS-Item 10

The EPDS is a ten-item screening instrument that has been widely used to assess both antepartum and postpartum depression (Cox et al. 1987). Item 10 of this instrument—"the thought of harming myself has occurred to me"—asks the respondent about the frequency of thoughts of self-harm in the previous week. For the present study, a positive score of 1 (hardly ever), 2 (sometimes), or 3 (quite often) on item 10 of the EPDS was considered to be indicative of suicidal ideation.

Assessment for maternal mood

The EPDS, a ten-item questionnaire, was used to screen for severity of depressive symptoms in the antepartum period. The EPDS items assess how participants felt during the previous 7 days. Response categories are scored 0, 1, 2, or 3 for each item according to increased severity of the symptoms. Items 3 and 5–10 are reverse-scored. The total score on this scale ranges between 0 and 30 and gives a measure of depressive symptoms during pregnancy. The EPDS has been validated for use with women both during the pregnancy and the postpartum periods. The instrument was used as an interviewer-administered version owing to disparity in the educational level of the participants.

Domestic violence and intimate partner violence

The questionnaire from the ICMR task force study on domestic and partner violence was used for the assessment of domestic violence and intimate partner violence (Indian Council of Medical Research 2011). The instrument comprised of 18 abusive behaviors categorized under psychological abuse (e.g., using abusive language, threatening, neglecting), physical abuse (e.g., hitting, scalding, burning), and sexual abuse (coercion, denial, causing sexual injury) from spouse and/or other family members. If the participants responded with a "yes" to any abusive behavior in the three categories, it indicated the presence of violence.

Maternity social support scale

The subjective perception of social support among participants was measured using the Maternity Social Support Scale from the prenatal psychosocial profile (Webster et al. 2000).

The questionnaire has eight items exploring support from spouse, other family members, and friends during pregnancy. The items were rated on a Likert-type 5-point scale with a score ranging between 8 and 40.

Sociodemographic measures

Data was collected on the age, educational level, employment, socioeconomic status (SES), and parity. The classification of SES was based on the income criteria from the modified Kuppuswamy's Socioeconomic Scale which specifies seven income brackets and categorizes them into five socioeconomic statuses—lower, upper lower, lower middle, upper middle, and upper (Bairwa et al. 2013). For the purpose of our study, the first three categories were classified under lower socioeconomic status (LSES) while the other two categories were classified under middle socioeconomic status (MSES).

Statistical analysis

Descriptive statistics such as mean (SD) for continuous variables and frequency (%) for categorical variables were used to describe the sample characteristics. Normality of data was checked by the Shapiro-Wilk test. The independent *t* test and ANOVA were employed to compare the mean scores between groups for the normally distributed variables, and corresponding non-parametric tests were used for non-normally distributed variables. Fisher's exact test was used to examine the association between categorical variables. Pearson correlation coefficient and Spearman's correlation coefficient were used to examine the relationship between continuous variables. Multivariate logistic regression was used to examine the predictors of suicidal ideation in pregnancy. A p value of less than 0.05 was considered to be statistically significant. All statistical analysis was performed using SPSS version 22.0 (SPSS Statistics 2013).

Results

Sociodemographic

The age of the participants ranged between 18 and 39 years with a mean age of 23 years (SD = 3.38 years). All women were married; 396 women (85.7 %) were home makers and 255 (55.2 %) lived in joint or extended families. The majority (n = 369; 79.9 %) had completed secondary level of education (7–10 years of formal schooling). Among the participants, the majority (n = 399; 86.4 %) belonged to LSES.

More than half of the participants (264 (57 %)) were multiparous. The mean week of pregnancy at the time of

assessment was 11.61 weeks (SD = 2.8 weeks), with the gestational age ranging between 5 and 20 weeks.

Past history of suicidal ideation and attempts

Lifetime prevalence of suicidal ideation, planning, or attempt was assessed using the SBQ. While 55 (11.9 %) women reported having contemplated suicide atleast once in their life, 22 (4.76 %) women had planned for suicide in their lifetime and 6(1.30 %) women reported a past history of suicide attempt.

Prevalence of suicidal ideation and attempts in the current pregnancy

From the current analysis, the overall prevalence of suicidal ideation during pregnancy (as reported on the SBQ or EPDS item 10) was found to be 7.6 % (35/462), with 5.4 % (25/462) of women having moderate-high suicidal risk (frequent thoughts, plans, or attempts).

Of the 35 women reporting suicidal ideation in the current pregnancy, 14 (40 %) had a past history of planned or attempted suicide.

Eleven (2.4 %) women had made a suicide plan during the current pregnancy, and 8 (1.7 %) women had attempted suicide at least once during the current pregnancy. Three out of the eight women who had attempted suicide during the current pregnancy had consumed an overdose of prescribed/over-the-counter medication (3/8), three women had attempted to hang themselves from the ceiling (3/8), and two women had attempted to jump from a height.

All eight women reported family-related stressors (financial issues, interpersonal issues with spouse and/or in-laws and/or domestic violence) as being the cause for the suicidal attempt. Table 1 gives a profile of the women who made an attempt during the current pregnancy.

Table 1 Profile of women reporting suicidal attempts in pregnancy

Socioeconomic status	Age in years	Years of marriage	Parity	EPDS score	No. of. attempts	Reasons	Method of suicide attempt
Low	21	4 months	Primi	0	1	Arguments with spouse, verbal abuse	Overdose of prescribed medication
Low	20	5 months	Primi	06	1	Arguments with in-laws and verbal abuse	Overdose of over the counter medication
Middle	18	6 months	Primi	08	2	Financial issues, dowry harassment, abuse from spouse	Overdose of over the counter medication
Middle	22	9 months	Primi	18	1	Verbal abuse by spouse	Attempted to jump from the first floor of a building
Low	19	11 months	Primi	20	1	Psychological abuse, verbal criticism	Hanging from the ceiling fan using a scarf
Middle	21	6 years	Multi	25	3	Conflict with spouse and in-laws	Attempted to jump from a hill
LSES	24	7 years	Multi	21	1	Financial loss, abuse by spouse and alcohol abuse in spouse	Hanging from the ceiling fan using a *sari*
LSES	25	10 years	Multi	23	2	Financial crisis and domestic violence	Hanging from ceiling fan using a *sari*

Prevalence of violence

Overall, 56 women (12 %) reported domestic violence. Almost two thirds of these women (64.3 %, $n = 36$) were subjected to some form of violence from an intimate partner. Women had reported partner violence in different forms; 97 % ($n = 35$) of the women experienced psychological abuse, 52.8 % ($n = 19$) reported physical abuse, and 19.4 % ($n = 7$) were subjected to sexual abuse by their spouse. Among women who reported suicidal ideation, the rate of domestic violence was 42.9 % ($n = 15$).

Depressive symptoms

The median scores on the EPDS of women with and without suicidal ideation were $\tilde{x} = 11$ (0, 28) and $\tilde{x} = 0$ (0, 22) respectively.

Bivariate analysis: correlates of suicidality

Women reporting suicidal ideation during pregnancy were of lower age compared to women who did not have any suicidal ideation during pregnancy ($p = 0.024$).

Fisher's exact test was performed to examine the relationship of the factors, namely, education level, employment status, SES, and parity, with suicidal ideation during the current pregnancy, and the results indicated that women from MSES were more likely than those from LSES to report suicidal ideation ($p = 0.003$).

The level of education ($p = 0.55$), employment status ($p = 0.80$), or parity ($p = 0.60$) was not associated with suicidal ideation. Experience of any form of domestic violence (psychological, physical, or sexual) ($p < 0.001$) and a past history of suicidality, including suicidal ideation ($p < 0.001$), planning ($p < 0.001$), and attempts ($p < 0.001$), were significantly associated with suicidal ideation during the current pregnancy.

Perceived social support was also significantly different among women with and without suicidal ideation during the current pregnancy; women with suicidal ideation perceived poor social support ($p < 0.001$).

Finally, there was a significant difference in the EPDS total scores of women with and without suicidal ideation. Results of the Mann-Whitney U test indicated that EPDS total score was higher among women with suicidal ideation during pregnancy compared to women without suicidal ideation during pregnancy ($p < 0.001$) (Table 2).

Multivariate analysis

Multivariate logistic regression analysis was performed to determine the predictors of suicidality during pregnancy (Table 3). Based on the results of the bivariate analysis, the predictor variables considered were the participant's age, SES, depressive symptoms, perceived social support, experience of intimate partner violence or domestic violence, and a past history of suicidality—ideation, planning, or attempt. The predictors in the final model of multivariate logistic regression were age, SES, perceived social support, depressive symptoms, and past history of suicidal ideation.

While severity of depressive symptoms increased (OR = 1.24, $p < 0.001$), the odds of suicidality during the current pregnancy, increased age (OR = 0.73, $p = 0.014$), and higher perceived social support (OR = 0.85, $p = 0.025$) decreased the odds of suicidality during pregnancy. Women from a middle/upper SES were nearly 11 times more likely to have suicidality in the current pregnancy as compared to those from LSES (OR = 11.09, $p = 0.025$). Having a past history of suicidal ideation was a robust predictor of suicidality during pregnancy (OR = 443.15, $p < 0.001$).

Based on the Hosmer and Lemeshow's goodness of fit test, the model is a good fit ($p = 0.98$) and the Negelkerke R^2 value is 0.82.

The overall accuracy of this model to predict subjects having suicidality is 97.3 %. The model has a sensitivity of 79.4 % and specificity of 98.8 %. The area under the ROC curve is given by 0.99 ($p < 0.001$, 95 % CI (0.985, 0.998)).

Discussion

Suicidality during pregnancy has important implications for maternal and infant health outcomes. In our sample of pregnant women, we found 7.6 % prevalence of suicidal ideation in the current pregnancy and 2 % had even made a suicide attempt during the current pregnancy. While the prevalence of suicidal ideation identified in this study was similar to few studies conducted among low-income populations (Huang et al. 2012; Zhong et al. 2014), our prevalence rate was lower than the rates of suicidal ideation reported by other studies from both low- and middle-income countries (LAMIC) (Asad et al. 2013; Castro et al. 2015; Gausia et al. 2009), as well as high-income countries (HIC) (Gavin et al. 2011; Newport et al. 2007). The wide variation in prevalence of suicidal ideation could be due to differences in operational definition, variations in the measures used for assessment, time point of assessment during the period of pregnancy (early vs. late pregnancy) and postpartum period and socioeconomic or demographic differences in the populations.

In terms of correlates of suicidality, we found that any form of domestic violence or intimate partner violence, severity of depressive symptoms, perception of poor social support, and a past history of suicidality were strongly correlated with suicidal ideation during pregnancy. Women's experience of domestic/intimate partner violence despite being the most prevalent factor among women with suicidality in the current pregnancy (42.9 %, $f = 15$) did not emerge as a significant

Table 2 Risk factors for current suicidal ideation (bivariate analysis)

	N (%)	Suicidal ideation (*N*, %)	*p* value
Years of education			0.55
Until 8	333 (72.1)	24/333 (7.21)	
More than 8	129 (27.9)	11/129 (8.53)	
Employment status			0.80
Unemployed	395 (85.5)	30/395 (7.59)	
Employed	66 (14.3)	4/66 (6.1)	
Socioeconomic status			0.003
LSES	399 (86.36)	24/399 (6.02)	
MSES	62 (13.42)	10/62 (16.13)	
Parity			0.60
Primi	226 (49)	19/226 (8.41)	
Multi	236 (51)	16/236 (6.78)	
Domestic violence			<0.001
No	406 (87.9)	14/406 (3.45)	
Yes	56 (12.1)	21/56 (37.5)	
Lifetime history of suicidal ideation			<0.001
No	411(89)	5/411 (1.22)	
Yes	51 (11)	30/51 (58.82)	
Lifetime history of suicidal plans			<0.001
No	434 (93.9)	17/434 (3.92)	
Yes	28 (6.1)	18/28 (64.29)	
Lifetime history of suicidal attempts			<0.001
No	456 (98.7)	31/456 (6.79)	
Yes	6 (1.3)	4/6 (66.67)	
	Statistic		
Age	23 (3.38)		0.024
Current depressive symptoms	0 (0, 28)		<0.001
Perceived social support	34.87 (5.16)		<0.001

predictor. Women who reported suicidality were more likely to be of a younger age and belong to the middle socioeconomic stratum. Other studies have found suicidal risk during pregnancy to be linked with factors such as verbal, physical, and sexual abuse (Asad et al. 2013; Gausia et al. 2009; Pinheiro et al. 2012); antenatal psychosocial stress (Gavin et al. 2011); greater severity of depressive and anxiety symptoms (Asad et al. 2013; Da Silva et al. 2012; Farias et al. 2013; Gavin et al. 2011; Huang et al. 2012; Newport et al. 2007; Pinheiro et al. 2012); poor social support (Castro et al. 2015); younger age (Devries et al. 2011); LSES; and lower education levels (Da Silva et al. 2012; Pinheiro et al. 2012). Our findings also indicated that having a past history of suicidal ideation in one's lifetime was the strongest predictor of current suicidal ideation, although the high odds ratio might be due to the skewed sample in the two groups. Past studies have identified past psychiatric illness and previous psychiatric treatment as being associated risk factors for suicidality during pregnancy (Castro et al. 2015; Huang et al. 2012); however, the relationship of past suicidal ideation is largely unexplored. This finding has implications for developing targeted interventions for at-risk women during pregnancy.

While we had hypothesized that women from the lower socioeconomic stratum will be more likely to report suicidal ideation, as reported by previous studies (Da Silva et al. 2012; Pinheiro et al. 2012; Qin and Mortensen 2003), our finding was contrary to this, in that women from the middle socioeconomic stratum were more likely to report suicidal ideation. This may be due to the skewed sample distribution in these two groups. If we had a higher sample of women from the MSES, it is likely that women who reported suicidal ideation may not have been as prominent as they are now in the small sample. Further, India is an economy in transition, and the

Table 3 Predictors of current suicidal ideation (multivariate analysis)

Current suicidal ideation	OR (95 % CIs)	*p* value
Age	0.72 (0.56–0.93)	0.014
Perceived social support	0.85 (0.74–0.98)	0.025
Depressive symptoms	1.24 (1.10–1.40)	<0.001
Socioeconomic status—MSES	11.09 (1.36–90.27)	0.025
Life time history of suicidal ideation	443.15 (55.24–3555.56)	<0.001

socioeconomic changes have significantly impacted stress levels in the salaried middle class (Varma 2007). However, future research employing larger and more representative samples may address this more systematically.

Further, the profile of reasons for attempting suicide during the current pregnancy indicated that family problems (financial/interpersonal issues) and violence in addition to depressive symptom severity were important associated factors. Also, half of all women who had made an attempt in the current pregnancy had a history of attempted suicide in the past as well. Previous studies have found that women were less likely to adopt violent means in making an attempt at suicide (Hawton 2000; Schapira et al. 2001), and the same was confirmed through the methods adopted by women in our study, namely, overdosing on medication, attempting to hang themselves from the ceiling, or attempting to jump from a height.

The findings from this study should be viewed in the context of certain limitations. The current data comes from a cross-sectional assessment of pregnant women in early and middle pregnancy and did not include women in the later stages of pregnancy. As with any self-reported measure, reports of suicide attempts in this study may be either underreported or overreported. Our sample is from a single antenatal clinic at a government setup in urban South Bangalore, and the results may be specific to low-income urban women from this geographical location, limiting the external validity of our findings.

Even so, the findings are strengthened firstly by the use of two instruments for the assessment of suicidality in pregnancy, thereby enabling better identification. Other studies have predominantly relied on either a single-item assessment or have utilized instruments aimed at symptomatic detection of suicidality during pregnancy. While item 10 of the EPDS is the most frequently used measure reported in existing literature, we used this along with the modified version of the Suicide Behavior Questionnaire-Revised (SBQ-R) which provides a better exploration of suicidal behaviors. Most of the previous studies have also only assessed suicidal ideation and not attempts. Secondly, women in the early stage of pregnancy have been assessed through this study. Past enquiries into suicidality in pregnancy have been conducted most often during the late pregnancy period. Early detection of suicidality in pregnancy will facilitate early intervention as well as the prevention of psychiatric morbidity in late pregnancy and the postpartum period. The study addresses a critical public mental health concern of suicidality in a vulnerable group of pregnant women. Studies using longitudinal cohort designs will be valuable in examining the relative contribution of maternal risk factors on infant and child outcomes.

Conclusion

The findings that 35 of the 462 (7.6 %) women reported suicidal ideation and 8 of the 462 women made a suicidal attempt during pregnancy underscore the need for assessment of psychiatric and psychosocial factors that confer risk among women in this vulnerable period. Further, following from this, longitudinal assessments in pregnant women at risk would be useful in also understanding causality and the risk for suicide among at-risk women in the postpartum period. Health providers who care for pregnant women are in a unique position to assess mental health and risk factors for the same. Training obstetric healthcare staff in public health settings to identify women at risk and provide support and referral should be an important initiative. While this will be challenging in a LAMIC with limited mental health resources, it cannot be ignored, given the implications of our findings for the health of the pregnant woman and the fetus.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no competing interests.

Ethical approval All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional ethics committee (IEC—NIMHANS).

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